11-10-2005

UM visiting scholar published in the prestigious journal nature

University of Montana--Missoula. Office of University Relations

The University of Montana

UNIVERSITY RELATIONS • MISSOULA, MT 59812 • 406-243-2522 • FAX: 406-243-4520

NEWS RELEASE

Nov. 10, 2005

Contact: Chris Filardi, visiting scholar, UM Wilderness Institute, (406) 549-2518.

UM VISITING SCHOLAR PUBLISHED IN THE PRESTIGIOUS JOURNAL NATURE

MISSOULA —

Two American Museum of Natural History biologists have overturned conventional thinking that islands are evolutionary "dead-ends" with a new study showing that birds from widely dispersed South Pacific islands have contributed to continental bird biodiversity in Australia.

One of those scientists, Christopher Filardi, currently is a visiting scholar at The University of Montana's Wilderness Institute.

For many years, scientists have assumed that continental species colonize islands in a one-way process. This new study of one of the original bird families used to bolster this assumption shows that islands actually can be sources of new species that manage to colonize back onto continents. In other words, biodiversity also flows from islands to continents, not just from continents to islands.

The new study by Filardi, biodiversity scientist in the Museum's Center for Biodiversity and Conservation and Department of Ornithology, and Robert G. Moyle, research scientist in the museum's Department of Ornithology and the Museum's Ambrose Monell Molecular Laboratory, is published in the latest issue of the journal Nature.

-more-

Dating back to Charles Darwin in the 19th century and earlier, islands and their flora and fauna have held a special fascination for scientists and naturalists, in part due to islands' rich biodiversity and the large proportion of species found on single islands and nowhere else on Earth.

The distribution of island birds, in particular, has been studied extensively and used to inform biological understanding of the formation of new species (speciation) and of broad evolutionary processes, including why certain species occur where they do region by region (biogeography).

Birds of the Pacific islands have been influential research subjects because of remarkable and unique patterns of diversity found there. Scientists with the Museum's Whitney South Seas Expedition (1921–1939) were pioneers in the discovery of that diversity. The new study of a diverse and brilliantly colored bird family, called monarch flycatchers, found throughout Australasia and the tropical Pacific, provides new estimates of the evolutionary relationships among these birds. Such estimates help scientists understand the processes behind patterns of geographical distribution of living things over space and time.

Earlier estimates based on traditional taxonomic surveys of monarch flycatchers and other Pacific species show fewer species on islands as one moves further and further from continents. This result, in combination with other patterns of island diversity, has led scientists over many years to assume that island biotas are the result of a one-way flow of colonists from continents to islands and island chains, or archipelagos. Since Ernst Mayr's seminal work on Pacific bird diversity, the assumption has been that bird species on the islands of northern

Melanesia originated in continental Australia and Asia.

In the new study of a broad sampling of continental and island monarch flycatchers, Filardi and Moyle have applied a more sophisticated test of the geographic source of island birds that involves studying the genetic relatedness among species and representing that as a branched evolutionary tree. Rather than assuming how various species of flycatchers are related based solely on geography and morphology, the team arrived at a new estimate for their relatedness and used that to reconstruct the history of how species evolved across the vastness of the Pacific.

Their analysis also shows that a large and diverse array of monarch flycatchers resulted from a single radiation, involving nearly every major Pacific archipelago, suggesting major diversification occurred entirely within island settings. In contrast, diversification in monarch flycatchers within continental settings appears quite limited when compared to the differentiation of color and shape achieved on islands.

In the past, many scientists have assumed that biodiversity "flows" only downstream from continents to islands because it is less challenging for a new species to take hold on islands, where fewer well-established and richly diverse forms and populations already exist. However, the team found instead that some species with ancestors originating on Pacific islands — Monarcha melanopsis and Monarcha frater — were able to take hold in Australia and New Guinea at some time in the past, demonstrating that biodiversity can also flow upstream.

"People have always assumed that the source for biodiversity has been continents,"

Filardi said. "Of course, the original source was continental, but if you look at island lineages and analyze all the unique forms at once as we have, you find that the Pacific is an engine of diversity and speciation that can contribute to continental diversity."

The branching pattern in the team's tree of relationships among flycatchers also fails to support the mode of new species dispersal previously thought to prevail. Instead of repeated dispersals of continental bird forms resulting in new forms of island flycatchers, the new paper shows that islands themselves generated flycatcher biodiversity, independent of continental biodiversity, in a single dispersal originating in the Pacific, not on the continent.

This new research suggests that conservation biologists and practitioners should refocus their thinking on the role that islands play in generating biodiversity.

"Islands aren't just little landforms worth saving as icons of evolutionary quirkiness or symbols of past diversification," Filardi said. "They are important in a broader sense and may contribute significantly to future diversity of life on Earth."

###

CBS
Local, dailies
111005natr